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THE WHITENING OF THE MOUNTAIN CEDAR, *SABINA SABINOIDES* (H.B.K.) SMALL

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(WITH PLATE 31, CONTAINING 7 FIGURES)

INTRODUCTION

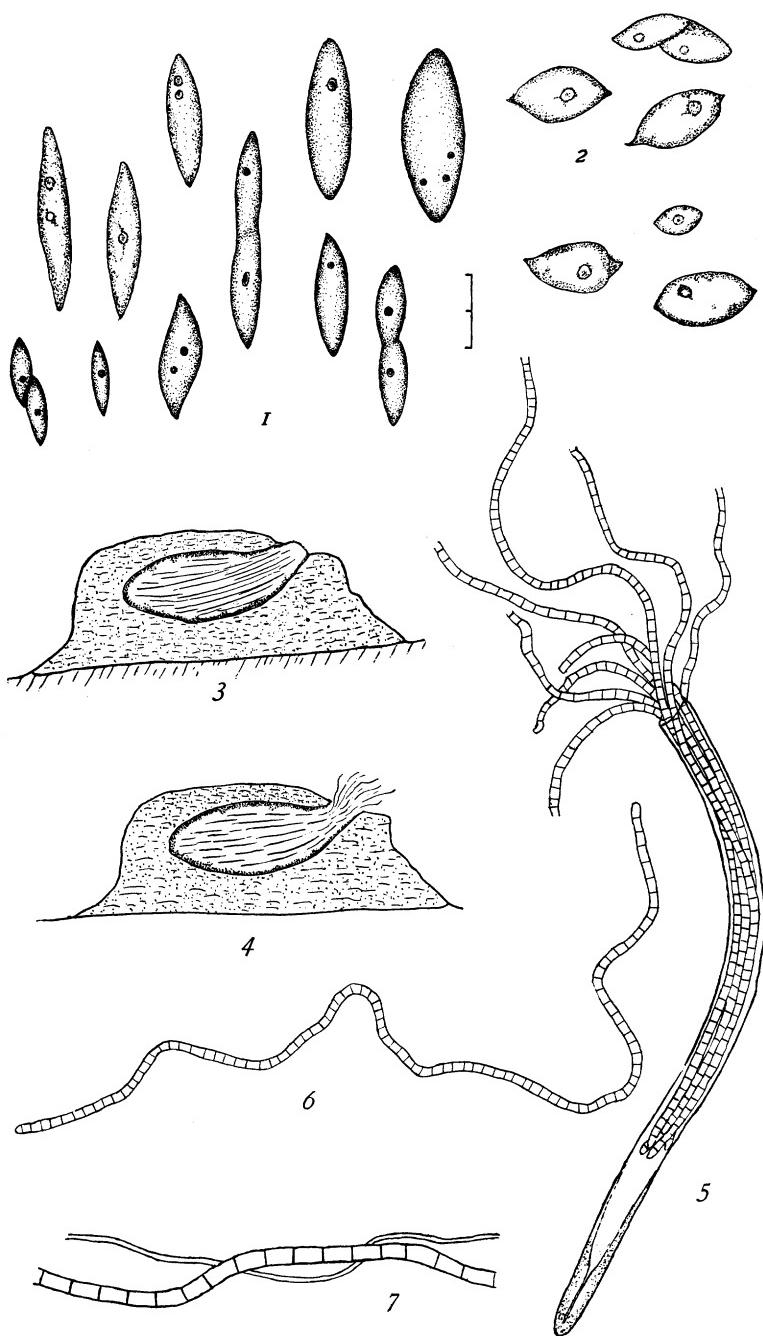
During the past two years a diseased condition of the mountain cedar has been made the subject of observation and study. This condition is produced by one of the ascigerous fungi, which, because of its peculiar structure, we were unable to assign to any described species. For this reason, some of the diseased material was sent to Professor C. H. Peck for identification. Because of several important structural characters in which it did not agree with previously described forms, he was unable to refer it to any known genus of fungi, stating, however, that its morphology most resembled that of *Ophioceras*.

Since receiving this information from Professor Peck, the collections at the National Museum at Washington and at the New York Botanical Garden have been examined by the senior author, and no previous collections of this fungus have been found.

GENERAL CHARACTERS

The most prominent symptom which is associated with the presence of this fungus is the occurrence of whitened areas on the trunk and branches of the affected trees. These areas may be small, although most frequently they are quite extensive. These

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CYANOSPORA ALBICEDRAE HEALD & WOLF

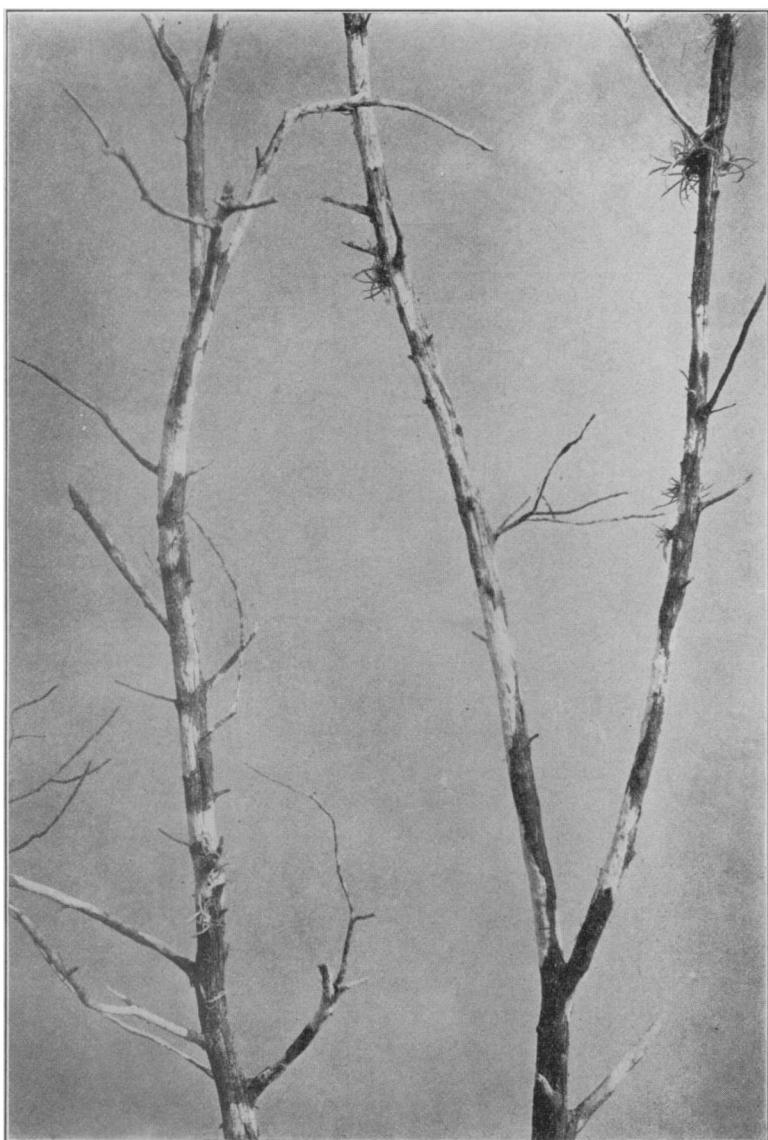


FIG. 1. View of host showing the conspicuous patches on which the fungus fruits are located.

white patches are so commonly found on the mountain cedar that Bray* used this character as one of the peculiarities by which to identify the tree (*fig. 1*). Upon these whitened areas may be found stromatic nodules containing the fruits of the fungus. On the older affected parts the branches become decorticated and the wood corroded so that dark, very prominently projecting wood nodules remain (*fig. 2*). On large trunks or branches or on parts not diseased for so long a time, the grayish nodules are embedded in the tissue of the bark and project only slightly or quite prominently (*fig. 3*). These nodules occur singly, or quite frequently two (rarely three) have fused end to end or partially along one side. They vary in length from less than 1 mm. to 2.25 mm. and are more or less lenticular in form. Those on the wood (*pl. 31, f. 1*) are more frequently longer and not so wide as those on the bark (*pl. 31, f. 2*), the latter being more nearly oval.

Projecting from the nodules are one to three short papillae, marking the ostioles of the embedded perithecia. The ostioles are rarely in the center of the nodule but typically nearer one end (*pl. 31, f. 1, 2*). The perithecia are prostrate, the neck of the perithecium being bent upward toward the surface (*pl. 31, f. 3, 4*). They are flask-shaped, with a slightly tapering neck, and vary in size from $825-1200 \times 260-400\mu$. By the corrosion of the tissue of the nodule, an elongated cavity is formed, the cavity-wall serving as the perithecial wall and being lined with only a delicate fungous membrane.

The numerous cylindrical asci, each containing six or eight filamentous spores, are embedded in a mucilaginous substance. When the nodules are moistened, the swelling of this mucilaginous matrix causes the extrusion of the asci and spores (*pl. 31, f. 4*) from the ostiole. The asci vary in size from $800-1100 \times 8-10\mu$ and have a very characteristically thickened apical wall, which compels the rupture of the lateral walls toward the base of the ascus. The spores which project from the broken basal end (*pl. 31, f. 5*) are always more or less coiled or twisted in response to the presence of moisture. The spores are very long, ranging

* Bray, W. L. Forest Resources of Texas; Bull. U. S. D. A. Bureau of Forestry 47: 54. 1904.

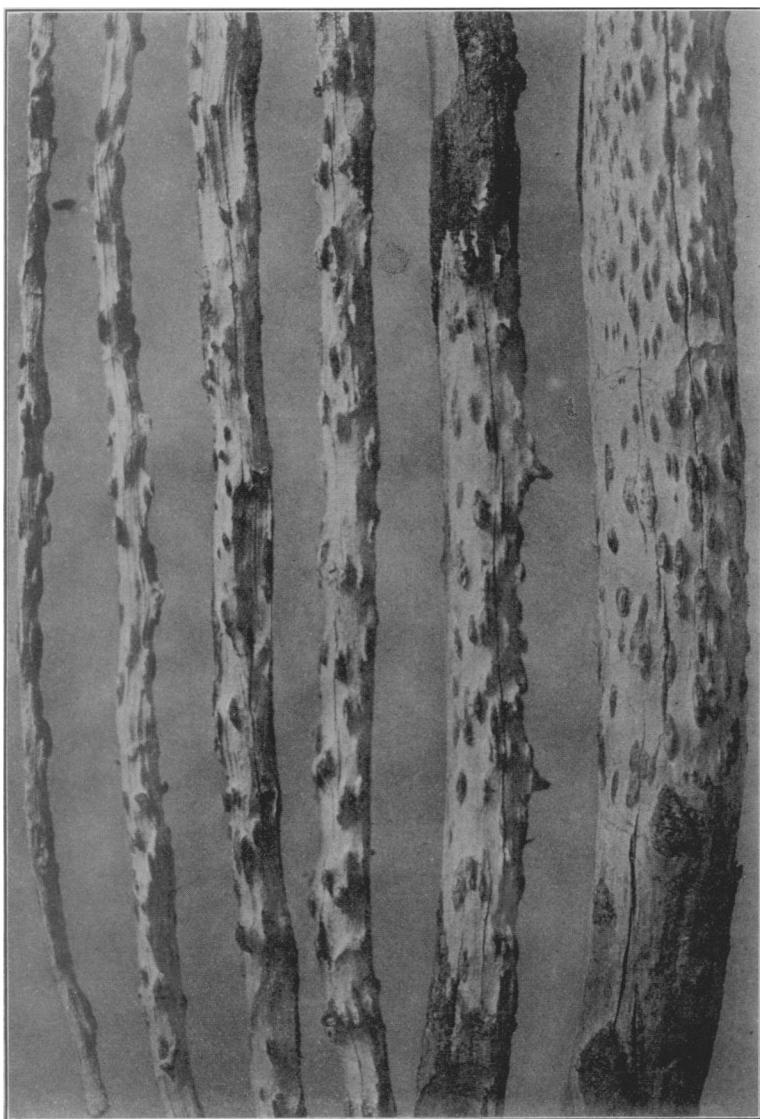


FIG. 2. Decorticated twigs showing numerous stromatic nodules.

from 600-1000 \times 3 μ , and at maturity they are faintly bluish, less mature specimens being hyaline (*pl. 31, f. 6*). They are multi-septate, generally curved or twisted, and each locule is twice as long as wide. The paraphyses, which are abundantly present, are unbranched, non-septate, and about one-third the width of the spores (*pl. 31, f. 7*).

GEOGRAPHICAL DISTRIBUTION

The mountain cedar is commonly present on the limestone slopes and hills throughout central, southwestern, and western Texas, and extends south into Mexico. In all probability the range of the fungus is co-extensive with the distribution of the mountain cedar. The disease has been observed to be present wherever the cedar occurs in the territory within a radius of one hundred miles of San Antonio.

EFFECT ON THE HOST

That the fungus is parasitic is very probable. It occurs most abundantly on the younger twigs and young trees, especially where there is more or less shading, such as occurs when the trees grow in dense brakes. The lowermost branches in such brakes are generally dry and covered with the whitish areas. The shading has only served to render the branches more susceptible to the attacks. The affected branches are not killed until the fungus surrounds them completely, corrodes the bark, and destroys the cambium layer. The corrosion of the dead branches may then continue and leave the protruding perithecial nodules as previously mentioned. Very frequently, entire trees of various ages or many of the branches are dead and whitened, apparently as a result of the inroads of the fungus.

TECHNICAL DESCRIPTION

Cyanospora gen. nov.

Peritheciis solitariis vel saepe duobus, raro tribus, pustulis cortici vel ligno immersis, horizontalibus, elongatis in eadem via quam axe stromatis, ostiolis lateralibus, leviter pertusis. Ascis gracilibus, linearibus, in matrici glutinosa, membranis internis apicis incrassatis, basi ruptis. Sporidiis filiformibus, pleurisep-tatis, hyalinis.

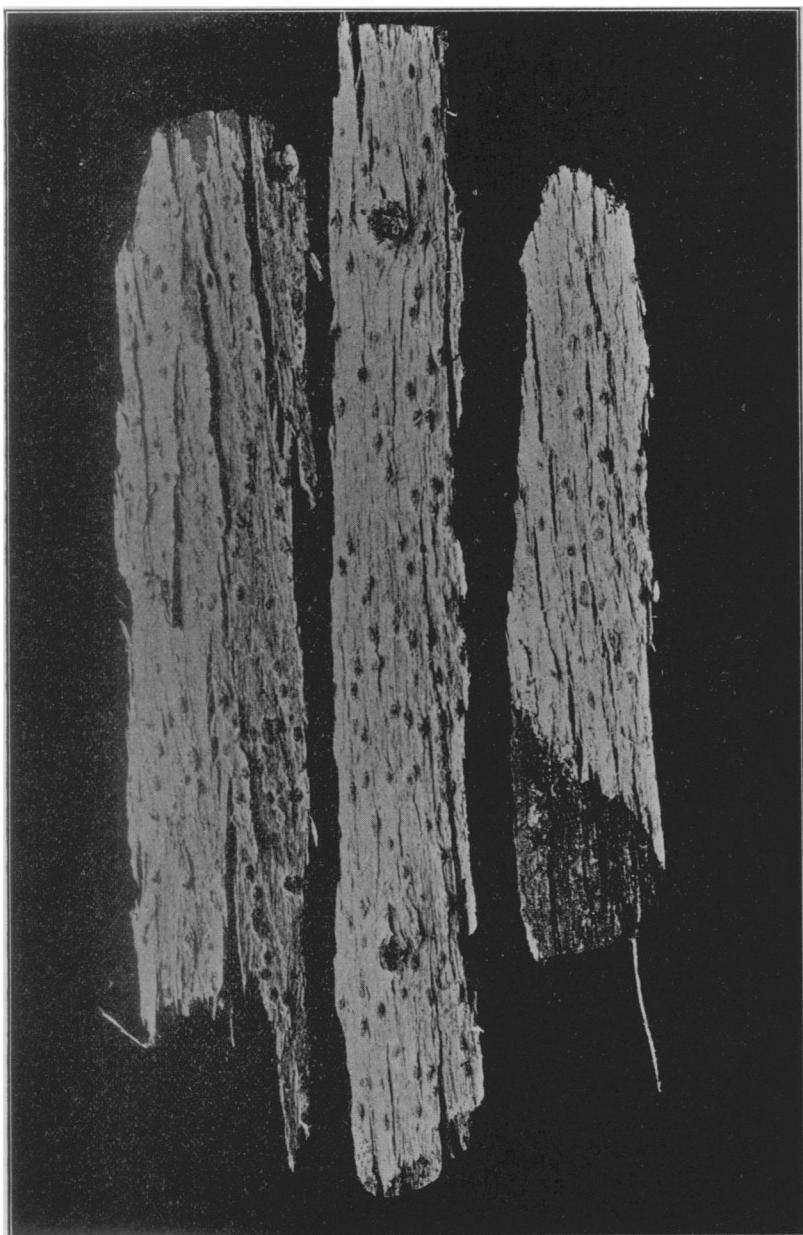


FIG. 3. Pieces of bark from living branches showing the white granular patches with numerous stromatic nodules.

***Cyanospora Albicedrae* sp. nov.**

Stromatibus corticis vel ligni in areis dealbatis in cortice vel lignis ramorum decorticatis. Stromatibus corticis griseis; stromatibus ligni plerumque nigrioribus, saepe atris, lignis corrodati. Pustulis omnibus plus vel minus lenticularibus, 1–2 mm. longis, plerumque solitariis vel 2–3 coacervatis. Peritheciis 1–3 in quoque stromate, saepius solitariis, $825-1200 \times 260-400\mu$, horizontalibus, elongatis in ipsa via quam axe stromatis, membranis tenuissimis, ligno vel cortice omnino immersis, ostiolo verso, leviter attenuato. Ascis gracilaribus, cylindraceis, $700-1100 \times 8-10\mu$, 6–8-sporis, base attenuata, membrana interna apice incrassata, obtusis. Ascis maturatibus supra basem ruptis liberatisque cum sporis exsertis, omnino strato glutinoso circumdati. Paraphysibus multis, simplicibus, continuis, 1μ diam. Sporidiis numquam rectis, plerumque curvulis vel contortis, pleuriseptatis, $600-1000 \times 3\mu$, hyalinis vel cyanophyceis, loculis leviter longioribus quam latis.

Hab. In cortice vel decorticato ligno *Sabinae sabinoidis* viventis.

RELATIONSHIP

This genus is apparently to be referred to the Ceratostomaceae, being perhaps most closely related to *Ophioceras*, from which it differs in several respects. The most important of these are shown in the following tabulation:

	<i>Cyanospora</i>	<i>Ophioceras</i>
Perithecia	horizontal	erect
	in stromatic nodules	not in stromatic nodules
	solitary or 2–3	solitary
Ostiolum	very short	elongated
Asci	thickened at apex	not thickened
	in gelatinous matrix	gelatinous matrix absent
Spores	very long	long

This indicates differences which would seem to be worthy of generic rank.

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EXPLANATION OF PLATE XXXI (frontispiece)

Fig. 1. Nodules from decorticated branches. (Length of entire scale 1 mm.)

Fig. 2. Nodules as they appear on the bark, showing the difference in size and form as compared with the wood nodules. (To the right of the scale.)

Fig. 3. Diagram of a longitudinal section of a nodule, cutting through a perithecium. $\times 28$.

Fig. 4. Diagrammatic longi-section of a nodule and perithecium with the asci and spores extruded. $\times 28$.

Fig. 5. Upper portion of a spore-sac showing the thickened apical wall and the coiled spores projecting beyond the broken basal end. $\times 360$.

Fig. 6. A single filamentous spore. $\times 360$.

Fig. 7. A fragment of a spore and paraphysis. $\times 720$.